AD NUMBER
AD011202
CLASSIFICATION CHANGES
TO: unclassified
FROM: confidential
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onr ltr, 22 dec 1977; onr ltr, 22 dec 1977

AD NUMBER

AD011202

CLASSIFICATION CHANGES

TO

confidential

FROM

secret

AUTHORITY

31 mar 1965, DoDD 5200.10

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11202

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Report No. 12810-9

Aerojet ENGINEERING CORPORATION

AZUSA, CALIFORNIA

INFORMAL REPORT OF PROGRESS

Copy No.

18 March 1953

TO: Head, Armament Branch
Naval Sciences Division
Office of Naval Research
Washington 25, D.C.

VIA: Bureau of Aeronautics Representative
Pasadena
c/o Aerojet Engineering Corporation
6352 N. Irwindale
Azusa, California

SUBJECT: Development of a Device for Mine-Sweeping

CONTRACT: Nonr-686(00)

PERIOD COVERED: 1 February through 28 February 1953

This is the ninth in a series of informal reports submitted in partial fulfillment of the contract.

AEROJET ENGINEERING CORPORATION

C. A. Gongwer
Manager
Underwater Engine Division

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SECURITY INFORMATION

I. OBJECTIVE

In accordance with Contract Nonr-686(00), as amended by Amendment No. 1, 1 December 1952, the following work is to be performed:

The Contractor shall (1) conduct research on pulsed-pressure signals; (2) design and construct an experimental vortex-ring generator of approximately prototype size for sea tests and development work; and (3) concurrently with the work required under (1) and (2), investigate the practical problems attending the use of such a device as a mine countermeasure and attempt to provide solutions to these problems, in order that the device may be readily applied to naval uses. This work shall include, but not necessarily be limited to, the following:

A. Completion of the prototype design

B. Construction of the prototype

C. Mounting and testing of the prototype on a Navy-furnished vessel

D. Concurrently with prototype development, the investigation of effects caused by nonvertical projection of the vortex, by motion of the generator during projection of the vortex, by the nature of the bottom, etc. upon the efficacy of the ring vortex in mine sweeping.

II. DESCRIPTION OF WORK

A. Recoil and counter-recoil tests have been continued on the 1/18-scale model generator and barge. With this small model no difficulty has been experienced in generating ring vortices with axes slanting 45° from the vertical. The ring vortices, 8 in. in diameter, have been observed to travel in a straight line for a distance of 15 ft, or 22.5 ring diameters, without loss of shape and with very little velocity reduction, before approaching the bottom. Radial expansion as the ring approached the bottom appeared to be normal, just as though the ring were approaching vertically.

B. Data obtained in the small-model tests are being used in the construction of a larger model barge for the 1/8-scale vortex generator. This is the largest model which can be used to advantage in the Aerojet ring channel, and it will be used for further developmental work while the prototype is being fabricated. It is planned to test barge construction, the effects of non-vertical projection of the vortex, and various fuel injection systems with this 1/8-scale model.

C. Upon receipt of Amendment No. 1 to the basic contract, the fabrication of the prototype was initiated. Actuating equipment has been selected, and purchase orders have been written. A delay of several months is expected in the arrival of most of the heavy valving and exhausting equipment. It is planned to make tests on fuel injection, ignition, scavenging, and proper sequencing of all gear at Aerojet before shipment to the test site. Because of the size and weight of the assembled vortex generator, it has been decided to deliver only the head of the generator to the Aerojet test area for testing. When the actuating gear and generator head have been checked, the head will be welded to the generator cylinder for shipment and assembly on the test barge. Preliminary testing at the Aerojet plant, it is believed, will save considerable time in final assembly, and will permit the design and fabrication of all brackets, mountings, and other fittings in the Aerojet machine shops, and also a complete check on operating equipment will be possible. Further, this method of testing and assembling will permit complete fabrication and preliminary testing of the generating device while the barge is being designed and fabricated, instead of delaying fabrication until the barge and the method of mounting the generator are determined.

D. Two types of barge construction are being investigated preparatory to submittal to the Navy Department of suggested designs. Both types make use of the bridge pontoons available in many naval establishments.

III. WORK PLANNED FOR THE NEXT REPORT PERIOD

A. It is planned to continue the purchase of equipment necessary for assembling the prototype generator.

B. Further study of the design of a practical system of mounting the generator on a barge will be conducted.

C. Work will be continued on the 1/8-scale model generator and barge in an attempt to gain reliable data on nonvertical projection and generator motion during the vortex generation period.